RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Borehole 51-08-11

Log Event A

Borehole Information

Farm : TX	**Tank :** TX-108	**Site Number :** 299-W15-135
N-Coord : 41,794	**W-Coord :** 76,080	**TOC Elevation :** 668.59
Water Level, ft :	**Date Drilled :** 11/30/1971	

Casing Record

Type : Steel-welded	Thickness, in. : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:

This borehole was drilled in November 1971 and completed to 100 ft. Though not specified in the driller's notes, a 6-in. casing was apparently installed between the ground surface and the bottom of the borehole. The driller's notes do not indicate that the casing was perforated. There is no indication that the bottom of borehole was cemented or that grout was placed in any interval.

The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

The top of the casing is the starting depth for the logs. The lip of the casing is about 3.5 ft above the ground surface and is surrounded by a concrete collar. The elevation of the top of the casing is indicated to be 668.6 ft above MSL; however, the elevation of the ground surface is about 669 ft. A section of casing may have been added to the top of the borehole sometime after the elevation survey was completed.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 11/1995	**Calibration Reference :** GJPO-HAN-3	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number :	1	**Log Run Date :**	2/8/1996	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	0.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	3.5	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	2	**Log Run Date :**	2/9/1996	**Logging Engineer:**	Bob Spatz
Start Depth, ft.:	98.5	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	10.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

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Log Run Number :	3	**Log Run Date :**	2/12/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	2.5	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	11.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Analysis Information

Analyst : H.D. Mac Lean

Data Processing Reference : P-GJPO-1787 Analysis Date : 11/27/1996

Analysis Notes :

The SGLS log of this borehole was completed in three logging runs. The pre-survey field verification spectra for the first and third log run did not pass the acceptance criteria established for the peak shape and system efficiency. A nonconformance report issued in August 1996 (N-96-05) identified the cause of this failure to be a power supply malfunction that resulted in a low detector bias voltage being supplied to the logging tool. This malfunction occurred in the mornings, because of inadequate system warm-up time. The nonconformance report also documents that radionuclide concentrations calculated from data collected within the first 2 hours of logging could be systematically underestimated by as much as 10 percent. Therefore the data from logging runs one and three (upper 11 ft of the borehole) may show a minor repeatability problem if the borehole is relogged in the future.

The post-survey field verification spectra for all logging runs were in conformance with the acceptance criteria established for the peak shape and system efficiency, indicating that the logging system was operating within prescribed specifications after an initial warm-up time. The energy calibration and peak-shape calibration from the post-survey verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation. The gain remained stable throughout the data collection activity; it was not neccessary to apply corrections for gain drift during data processing in order to maintain proper peak identification.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

Depth overlaps, where data was collected at common depth locations by separate logging runs, occurred between 10 and 11 ft and between 2.5 and 3.5 ft. The concentrations of Cs-137 and KUT were calculated at the overlapping points using the separate data sets. The measured concentrations using the separate data sets were within the uncertainty of the measurements, indicating acceptable repeatability of the measurements.

The only man-made radionuclide encountered during the survey was Cs-137. Detectable Cs-137 concentrations were measured continuously from the ground surface to about 4 ft, between 7 and 7.5 ft, and at 10 ft. The maximum measured Cs-137 concentration of about 10 pCi/g occurred at 1 ft. Below 4 ft, all measured Cs-137 concentrations were less than 1 pCi/g; most measured concentrations below this depth were about 0.2 pCi/g, barely above the MDL.

A step-like increase in the K-40 concentration and in the total gamma-ray count rate was detected at a depth of 49 ft. Measured concentrations are about 12 pCi/g above 49 ft and about 18 pCi/g below this depth.

A decrease in the K-40 concentrations was detected at a depth of 98 ft. The U-238 and Th-232 concentrations

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increase at this depth, along with the total gamma-ray count rate.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank TX-108.

Log Plot Notes:

Separate log plots show the concentrations of the man-made radionuclide (Cs-137) and the naturally occurring radionuclides (KUT). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.